

518, 398

Rec'd PCT/PCT 17 DEC 2004

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
18 March 2004 (18.03.2004)

PCT

(10) International Publication Number  
**WO 2004/022437 A2**

(51) International Patent Classification<sup>7</sup>:**B65D 5/74**

(74) Agents: JORIO, Paolo et al.; STUDIO TORTA S.r.l., Via Viotti, 9, I-10121 TORINO (IT).

(21) International Application Number:

PCT/EP2003/050614

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date:

8 September 2003 (08.09.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

02425553.1

9 September 2002 (09.09.2002) EP

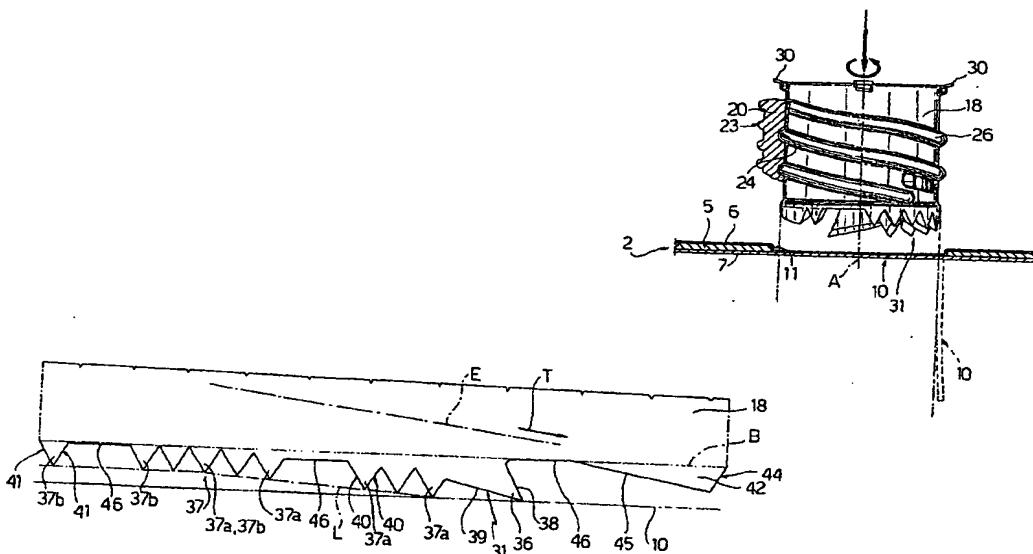
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).(71) Applicant (*for all designated States except US*): TETRA LAVAL HOLDINGS & FINANCE SA [CH/CH]; Avenue Général-Guisan, 70, CH-1009 PULLY (CH).

## Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CLOSABLE OPENING DEVICE FOR PACKAGES OF POURABLE FOOD PRODUCTS



WO 2004/022437 A2

(57) Abstract: A closable opening device (4) having a frame (15) defining a through hole (16) and fitted about a pierceable portion (10) of a sealed package (1) for pourable food products; a removable threaded cap (17) which screws onto the frame (15) to close the hole (16); and a tubular cutting member (18) screwed inside the hole (16) and rotated by the cap (17) to travel through the pierceable portion. The cutting member (18) has an end cutting edge (31), in turn having a main blade (36), and a number of teeth (37a) located behind the main blade (36) and decreasing gradually in height so as to act successively on the pierceable portion (10).

BEST AVAILABLE COPY



Rec'd PCT/PTO 17 DEC 2004

10/518398

WO 2004/022437

PCT/EP2003/050614

5

CLOSABLE OPENING DEVICE FOR PACKAGES OF POURABLE FOOD

PRODUCTS

10 TECHNICAL FIELD

The present invention relates to a closable opening device for packages of pourable food products.

BACKGROUND ART

As is known, many pourable food products, such as  
15 fruit juice, UHT (ultra-high-temperature treated) milk,  
wine, tomato sauce, etc., are sold in packages made of  
sterilized packaging material.

A typical example of such a package is the  
parallelepiped-shaped package for liquid or pourable food  
20 products known as Tetra Brik Aseptic (registered  
trademark), which is produced by folding and sealing a  
web of laminated packaging material. The packaging  
material has a multilayer structure comprising a layer of  
fibrous material, e.g. paper, covered on both sides with  
25 layers of heat-seal plastic material, e.g. polyethylene;  
and, in the case of aseptic packages for long-storage  
products, such as UHT milk, the packaging material  
comprises a layer of oxygen-barrier material, e.g.

aluminium foil, which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material eventually forming the inner face of the package contacting the food product.

Such packages are normally produced on fully automatic packaging machines, on which a continuous tube is formed from the web-fed packaging material. The web of packaging material is sterilized on the packaging machine, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution, which, after sterilization, is removed, e.g. vaporized by heating, from the surfaces of the packaging material; and the web of packaging material so sterilized is maintained in a closed sterile environment, and is folded and sealed longitudinally to form a vertical tube.

The tube is filled with the sterilized or sterile-processed food product, and is sealed and cut along equally spaced cross sections to form pillow packs, which are then folded mechanically to form the finished, e.g. substantially parallelepiped-shaped packages.

Alternatively, the packaging material may be cut into blanks, which are folded on forming spindles to form the packages, which are then filled with the food product and sealed. An example of this type of package is the "gable-top" package commonly known by the trade name Tetra Rex (registered trademark).

To open the above packages, various solutions have

been proposed, one of which, known from US Patents N. 4,655,387 and N. 4,410,128, consists in forming, at a corner of a flap on the package, a preferential tear line defined by a succession of perforations extending through 5 the outer layers of the packaging material down to the barrier material layer; and the package is opened by lifting the flap and cutting or tearing along the perforations. Needless to say, packages of this sort, once opened, cannot be closed again, and must therefore 10 be handled with care to avoid spillage of the food product until the package is emptied.

To overcome this drawback, packages of the above type are fitted with closable opening devices, which substantially comprise a frame defining an opening and 15 applied about a hole or a removable or pierceable portion in a wall of the package; and a cap hinged to the frame. The cap is normally molded integrally with the frame, and is initially sealed to the frame, along a peripheral edge surrounding the opening, by a thin breakable annular 20 connecting portion. Once unsealed, the cap is movable between a closed position cooperating hermetically with the frame, and an open position. Alternatively, threaded caps separate from and initially screwed to the frame are also used.

25 One problem of opening devices of the type described is that the cap must be detachable from the frame with practically no effort required when unsealing the package. For which purpose, the opening devices are made

of low-break-strength plastic material, normally polyethylene.

Polyethylene, however, has the drawback of failing to act as an effective oxygen barrier. On the side of the packaging material eventually defining the inside of the package, therefore, the hole is closed by an additional patch comprising a small sheet of heat-seal plastic material, and the opposite side of the packaging material is fitted with an oxygen barrier element, e.g. a pull-off tab, which is heat sealed to the patch and has a layer of aluminium.

Providing the packages with a patch and barrier element, however, calls for additional processing of the packaging material before it is sterilized and folded and sealed to form the vertical tube, so that the packages take longer, and hence are more expensive, to produce.

Moreover, once the cap is opened, access to the content of the package also involves removing the barrier element.

Closable opening devices have therefore been proposed by which the package can be opened in one operation, while at the same time ensuring an effective oxygen barrier.

In the solution described in International Patent Application WO 95/05996, such opening devices substantially comprise a frame having a cylindrical collar defining a pour opening and fitted about a pierceable portion of the package; a removable cap which

is screwed externally to the frame collar to close the opening; and a substantially tubular cutting member screwed inside the frame collar and having an end edge with a number of substantially triangular end teeth,  
5 which cooperate with the pierceable portion of the package to detach it partly, i.e. with the exception of a small peripheral portion, from the relative wall.

The cutting member is operated by the cap via one-way ratchet-type transmission means activated when  
10 removing the cap from the collar, and spirals with respect to the frame from a raised rest position in which the end teeth face the pierceable portion, to successive lowered cutting positions in which the end teeth interact simultaneously with the pierceable portion.

15 A drawback of opening devices of the above type is that the cut part of the pierceable portion tends, in use, to at least partly clog the open section of the cutting member, and therefore the pour opening, thus interfering with outflow of the product from the package.

20 Moreover, for functional reasons, the cutting member is normally made of material (e.g. polypropylene) structurally more rigid than that of the frame and cap (normally polyethylene), thus possibility resulting in excessive fragility of the end teeth of the cutting member, which may snap off during transport and/or when  
25 unsealing the package, and so become dispersed in the food product.

These problems have been solved by the solution

described in EP-A-1 088 765, wherein the end edge of the cutting member comprises a single cutting edge acting along a predominant peripheral portion of the pierceable portion of the package.

5 In addition to cutting, a single cutting edge moving spirally and acting along a predominant peripheral portion of the pierceable portion of the package also exerts thrust on the cut part of the pierceable portion, and tends to fold it inwards of the package and outwards  
10 of and eventually around the cutting member, thus preventing the cut part of the pierceable portion from interfering with outflow of the product from the package.

Moreover, using an appropriately designed single cutting edge enables a high degree of efficiency of the  
15 cutting member, which may therefore be made of less rigid material, e.g. the same as the cap and frame, and may advantageously be molded in one piece with the frame.

Though usable to advantage in most applications, the above solution is limited as regards the material from  
20 which the pierceable portion of the package is made. That is, when the pierceable portion is made of particularly tough material, such as a barrier material covered with a polymer catalyzed by means of an organometal or metallocene, the latter tends to "stretch" rather than  
25 tear under the action of the cutting edge, thus forming threadlike residue on the cutting edge, which may get into the food product.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a closable opening device designed to eliminate the aforementioned drawbacks typically associated with known devices.

5 According to the present invention, there is provided an opening device as claimed in Claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred, non-limiting embodiment of the present invention will be described by way of example with 10 reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective of a top portion of a sealed package for pourable food products featuring a closable opening device in accordance with the present invention;

15 Figure 2 shows a partly exploded view in perspective of the Figure 1 opening device in an as-used condition;

Figure 3 shows a side view of a detail of the Figure 1 device in a preassembly condition before being fitted to the package;

20 Figure 4 shows a side view of a cutting member of the Figure 1 device, positioned facing a pierceable portion of the package;

Figure 5 shows a plan view of the Figure 4 cutting member;

25 Figure 6 shows a spread-out flat view of the profile of the Figure 4 cutting member;

Figure 7 shows a larger-scale view of a detail in Figure 6.

BEST MODE FOR CARRYING OUT THE INVENTION

Number 1 in Figure 1 indicates as a whole an aseptic sealed package for pourable food products, e.g. a parallelepiped-shaped package known as Tetra Brik Aseptic (registered trademark), which is made of sheet packaging material 2, and has a top wall 3 to which a closable opening device 4 of plastic material is applied by means of conventional fastening systems, e.g. adhesive substances or microflame or laser heat sealing techniques.

Packaging material 2 (Figure 4) has a multilayer structure comprising, for example, a layer of paper material 5; an outer layer 6 of thermoplastic material, e.g. polyethylene; and a number of inner cover layers, hereinafter referred to as a whole as "inner covering 7". In the case of aseptic packages for long-storage products, such as UHT milk, fruit juice, etc., inner covering 7 typically comprises an intermediate barrier layer, e.g. of aluminium, in turn covered by one or more layers of thermoplastic material. The inner layer of thermoplastic material contacting the product in use is preferably defined by a low-linear-density (LLD) polyethylene catalyzed with a metallocene and of excellent mechanical strength and, in particular, a high stretch modulus.

Wall 3 has a pierceable portion 10 covered externally, in use, by opening device 4, and which is at least partly detached from wall 3 to permit outflow of

the product from package 1.

Pierceable portion 10 is preferably defined by a so-called "prelaminated hole", i.e. a hole 11 formed through the layer of paper material 5 prior to laminating outer layer 6 and inner covering 7, which therefore adhere to each other inside hole 11 and define pierceable portion 10 (Figure 4).

With reference to Figures 2 and 3, opening device 4 comprises a frame 15 fixed to package 1 about pierceable portion 10, and having a circular through hole 16 of axis A, through which the food product is poured; a cap 17 which is fitted coaxially to frame 15 to close opening 16; and a tubular cutting member 18 of axis A, which in use engages hole 16 in axially and angularly movable manner, and is activated by cap 17, as described in EP-A-1 088 765 incorporated herein by way of reference, to interact with pierceable portion 10 of wall 3 and unseal package 1.

Frame 15 comprises an annular base flange 19 fixed to wall 3 of package 1, about pierceable portion 10, and from whose radially inner edge projects axially a cylindrical collar 20, of axis A, defining hole 16.

Collar 20 has an outer thread 23 and an inner thread 24 (Figure 4), which are oppositely inclined and engaged respectively, in use, by an inner thread 25 of cap 17 and an outer thread 26 of cutting member 18.

Conveniently, thread 23 is a conventional right-hand thread; and thread 24 is a left-hand, multi-start thread

with a wider pitch than thread 23.

Cap 17 comprises a circular end wall 27; and a substantially cylindrical lateral wall 28 having inner thread 25 and outer projections 29 for easy grip.

5 Cap 17 and frame 15 are conveniently provided with tampering detecting means - not shown by being known and not forming part of the invention - for securing cap 17 and frame 15 in a position sealing package 1, and an example of which is illustrated in EP-A-1 088 765  
10 referred to above.

Cutting member 18 is conveniently injection molded in one piece with the frame in the preassembly position shown in Figure 3, in which one axial end of cutting member 18 is temporarily connected to flange 19 of frame 15 by a number of breakable radial bridges 30 surrounding hole 16. Cutting member 18 is screwed, in use, inside collar 20 of frame 15, and is conveniently driven axially into collar 20 before frame 15 is fitted to package 1.

Cutting member 18 (Figure 5) has two or more inner 20 axial ribs 32 designed to cooperate with respective transmission members 33 projecting axially from end wall 27 of cap 17 and shown schematically by the dash lines in Figure 5. Ribs 32 and transmission members 33 define a one-way transmission device - known from EP-A-1 088 765 25 and not described here in detail - by which cap 17 is connected rotationally to cutting member 18 in the cap unscrewing direction shown by the arrows in Figure 5, but is disconnected in the opposite direction.

Cap 17 is also conveniently driven axially onto collar 20 when assembling opening device 4.

At the opposite axial end, cutting member 18 comprises a cutting edge 31 designed to interact with 5 pierceable portion 10 of package 1 (Figure 4).

According to the present invention, cutting edge 31 comprises, successively along its circumference, a main blade 36 and a number of teeth 37, as shown clearly in the spread-out flat view of cutting member 18 in Figure 10 6, and in Figure 7 showing a larger-scale view of the profile of cutting edge 31.

Main blade 36 is in the form of an asymmetrical triangle with one back-sloping side 38 facing in the cutting direction, and an opposite side 39 sloping 15 slightly more than the slope of thread 26 indicated by line E in Figure 7. The teeth, indicated as a whole by 37, may be divided into a first set 37a and a second set 37b.

Teeth 37a, which, proceeding along cutting edge 31 20 in the opposite direction to the rotation direction of cutting member 18, are located just behind main blade 36, each have a triangular profile with symmetrically sloping sides 40, and get gradually smaller in height with respect to a base line B of the profile of cutting edge 25 31. More specifically, the first tooth 37a, adjacent to main blade 36, is preferably the same height as the main blade, and the following teeth 37a decrease linearly in height so that teeth 37a contact pierceable portion 10

one after another. The slope of the line L through the apexes of teeth 37a is conveniently less than that of the thread, so that teeth 37a contact pierceable portion 10 are separate, spaced points.

5       Teeth 37b, located on the opposite side of teeth 37a to main tooth 36, i.e. after teeth 37a in the rotation direction of cutting member 18, each have a triangular profile with symmetrically sloping sides 41, and are of constant height - with respect to base line B of the  
10 profile of cutting edge 31 - conveniently equal to that of the last tooth 37a, which may therefore also be considered the first tooth 37b.

Cutting edge 31 also comprises an auxiliary blade 42, which has a much larger circumference than teeth 37 -  
15 preferably 3 to 7 times, and even more preferably about 5 times the width of each tooth 37 - and is defined by a cutting side 44 facing in the traveling direction of cutting edge 31 with respect to pierceable portion 10, and having substantially the same slope as the sides of  
20 teeth 37, and by a guide side 45 sloping much less sharply and preferably having the same slope as side 39 of main blade 36.

Cutting edge 31 comprises three flat areas 46 withdrawn axially with respect to teeth 37 and blades 42,  
25 36, and spaced circumferentially along edge 31. Areas 46, which are located along or close to base line B, have no cutting function, and serve as thrust surfaces for a tool (not shown) by which to drive cutting member 18 inside

collar 20 as of the preassembly position.

Operation of opening device 4 will be described as of the sealed position shown in Figures 1 and 2 (in Figure 2, cap 17 is shown detached for the sake of clarity) in which cutting member 18 is housed entirely inside collar 20, with cutting edge 31 facing the as yet uncut pierceable portion 10 (Figure 4).

When rotated in the opening direction (anticlockwise in Figure 5), cap 17 - possibly after rotating idly to break the tampering detecting means - rotates cutting member 18 by transmission members 33 engaging ribs 32.

Given the opposite slope of threads 24 and 26, as cap 17 is unscrewed, cutting member 18 moves axially downwards to interact with pierceable portion 10.

To appreciate clearly the way in which cutting edge 31 interacts with pierceable portion 10, it should be pointed out, as shown in Figure 7, that cutting edge 31 moves along a spiral path which, spread out flat, is tantamount to translation in a direction T forming, with the plane of pierceable portion 10, an angle equal to the slope of thread 26 and therefore parallel to line E.

Main blade 36 and first tooth 37a come into play first, simultaneously with each other. And once the material is pierced by main blade 36, the "hook" shape of main blade 36 "hooks up" the material and pulls it circumferentially to prevent any noticeable movement of the material under the axial component of the thrust exerted by the travel of cutting member 18, and so

prevent the material from escaping the action of teeth 37a.

Teeth 37a come into play by degrees and in rapid succession to simulate the perforation which would be obtained with a vertical movement. Teeth 37a pierce the material and each cut the portion of material between its own point of contact and the incision made by the tooth 37a in front, so that cutting is not entrusted entirely to main blade 36, and horizontal stretching of the material is reduced.

Teeth 37b and secondary blade 42 come into play substantially simultaneously, and in turn first pierce the material and then make a continuous cut as the cutting member is rotated.

The cutting action of the cutting member terminates after one turn of cutting member 18 - as of the position in which pierceable portion 10 is first contacted - which is sufficient for the cutting member to penetrate pierceable portion 10 axially down to base line B, and corresponds to a roughly  $270^\circ$  cut. The part of the pierceable portion which remains uncut and prevents it from being detached completely is the portion between the maximum penetration point of main blade 36 and the initial piercing point of secondary blade 42. Further rotation of cutting member 18 folds this portion axially outwards of cutting member 18, without cutting it, as shown schematically by the dash line in Figure 4, so that pierceable portion 10 is moved clear of hole 16 in frame

15, and does not interfere with outflow of the food product from package 1.

As cap 17 - which, in the meantime has made roughly a full turn about axis A - is unscrewed further, ribs 32 5 and transmission members 33 are disengaged axially, so that cutting member 18 is arrested in the lowered opening position projecting axially from frame 15 and inwards of package 1, but still connected to collar 20 by engagement of threads 24 and 26.

10 Cap 17 is screwed off completely to open package 1, which can be closed by simply screwing cap 17 back onto collar 20.

Once package 1 is unsealed, cutting member 18 can no longer be moved from the lowered opening position, by 15 transmission members 33 being unable to reach an axial position in which to engage ribs 32 of cutting member 18, so that cutting member 18 holds the cut part of pierceable portion 10 back clear of hole 16.

Tests have shown that a cutting member 18 in 20 accordance with the present invention provides for cutting pierceable portion 10 of package 1 without leaving any threadlike residue, even when using an inner covering of thermoplastic material with a high stretch modulus, and also for folding pierceable portion 10 25 correctly outwards of cutting member 18.

Clearly, changes may be made to opening device 4 as described and illustrated herein without, however, departing from the scope of the accompanying Claims.

## CLAIMS

1) A closable opening device (4) for a sealed package (1) of a pourable food product, said device (4)  
5 comprising:

- a frame (15) fitted about a pierceable portion (10) of said package (1) and defining a through hole (16);

10 - a removable threaded cap (17) which screws onto said frame (15) to close said hole (16);

- a tubular cutting member (18) engaging said hole (16) and having an end cutting edge (31) which cooperates with said pierceable portion (10) to unseal said package (1);

15 - first connecting means (32, 33) for connecting said cap (17) and said cutting member (18) so as to rotate said cutting member (18) during rotation of the cap (17) to unscrew the cap off said frame (15) when unsealing said package (1); and

20 - second connecting means (24, 26) for connecting said frame (15) and said cutting member (18) so as to move said cutting member (18) along a spiral path through said pierceable portion (10) in response to said rotation of said cap (17);

25 characterized in that said cutting edge (31) comprises a main blade (36); and at least a number of first teeth (37a) which, proceeding along said cutting edge (31) in the opposite direction to the direction of

rotation of said cutting member (18), are located downstream from the main blade (36); said first teeth decreasing gradually in height so as to act successively on said pierceable portion (10).

5        2) A device as claimed in Claim 1, characterized in that said main blade (36) has a cutting side (38) facing in a traveling direction of said cutting member (18) with respect to said pierceable portion (10) and sloping backwards.

10        3) A device as claimed in Claim 1 or 2, characterized in that the first teeth (37a) decrease linearly in height as of said main blade (36).

15        4) A device as claimed in Claim 3, characterized in that said first teeth (37a) have respective ends lying along a line (L) sloping less than said spiral path (T) of said cutting member (18).

20        5) A device as claimed in Claim 3 or 4, characterized in that one of said first teeth (37a), located adjacent to said main blade (36), is the same height as said main blade (36).

25        6) A device as claimed in any one of the foregoing Claims, characterized in that said cutting edge (31) of said cutting member (18) comprises a number of second teeth (37b) located on the opposite side of said first teeth (37a) to said main blade (36).

7) A device as claimed in Claim 6, characterized in that said second teeth (37b) are all the same height, and are at most equal to the minimum height of said first

teeth (37a).

8) A device as claimed in Claim 6 or 7, characterized in that said cutting edge (31) of said cutting member (18) comprises an auxiliary blade (42) having a circumference which is 3 to 7 times the width of one of said first or second teeth (37a, 37b).

9) A device as claimed in Claim 8, characterized in that said auxiliary blade (42) has a cutting side (44) facing in the traveling direction of said cutting member, and having substantially the same slope as the sides of said first and second teeth (37a, 37b).

10) A device as claimed in any one of the foregoing Claims, characterized in that said frame (15) comprises a cylindrical collar (20) for receiving said cap (17) and defining said hole (16); and in that said second connecting means comprise an inner thread (24) of said collar (20) and an outer thread (26) of said cutting member (18).

11) A device as claimed in any one of the foregoing Claims, characterized in that said frame (15) and said cutting member (18) are molded in one piece in a preassembly configuration in which they are joined coaxially with each other by breakable joining means (30).

1 / 3

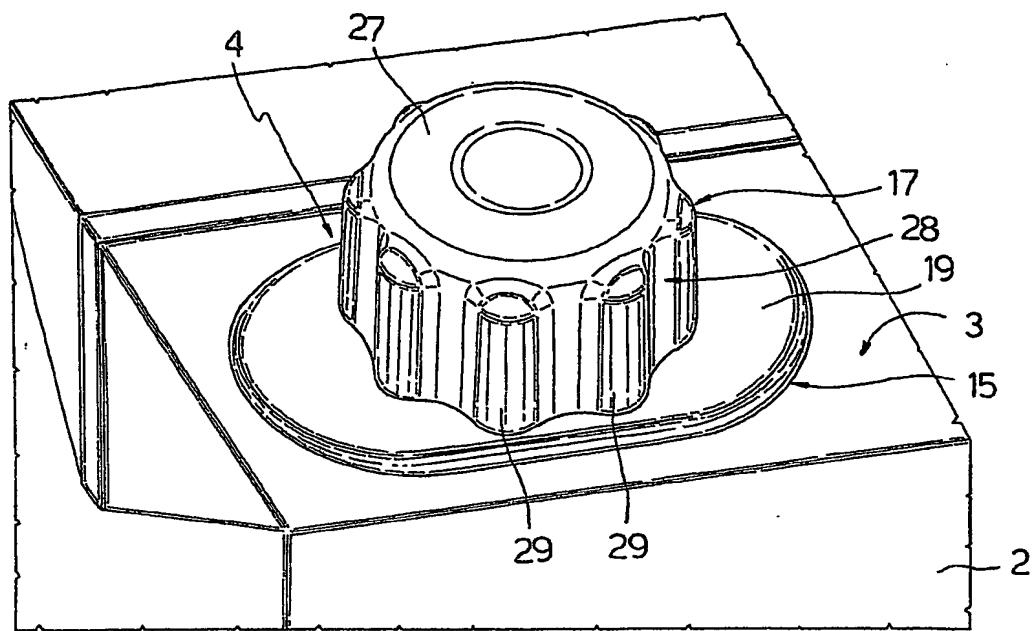


Fig.1

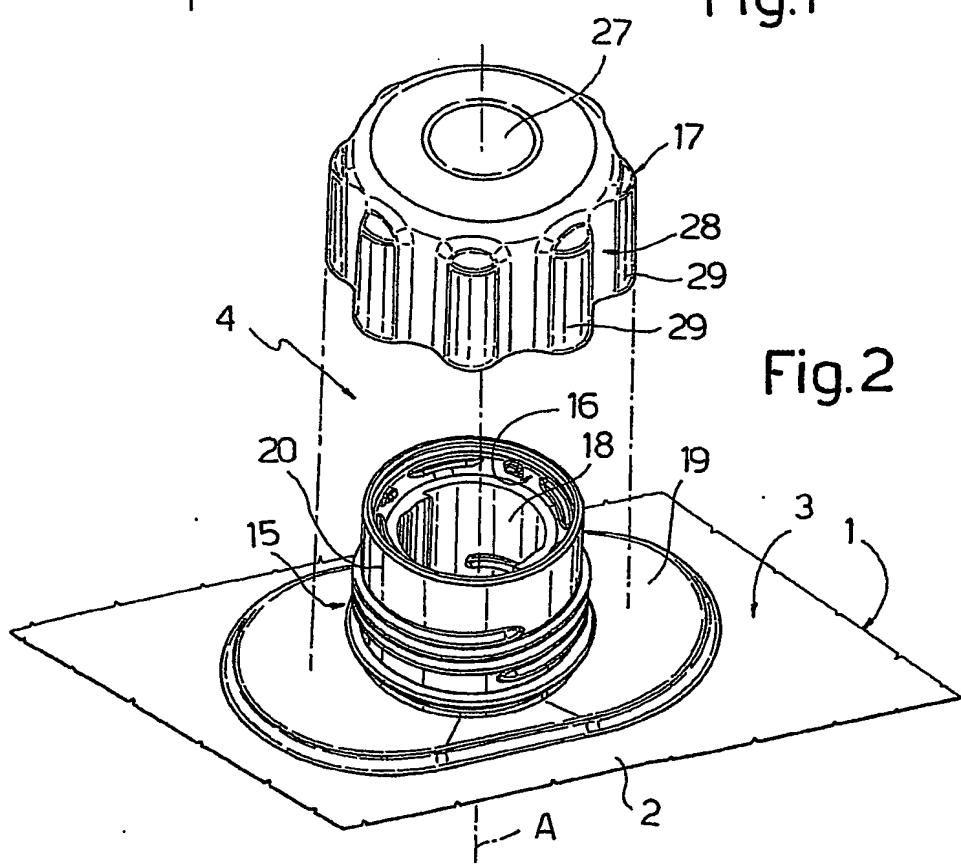
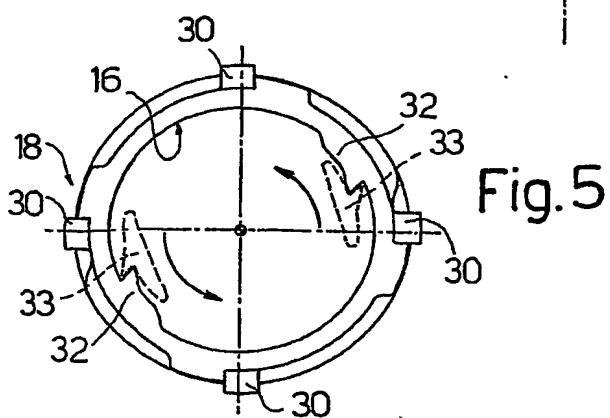
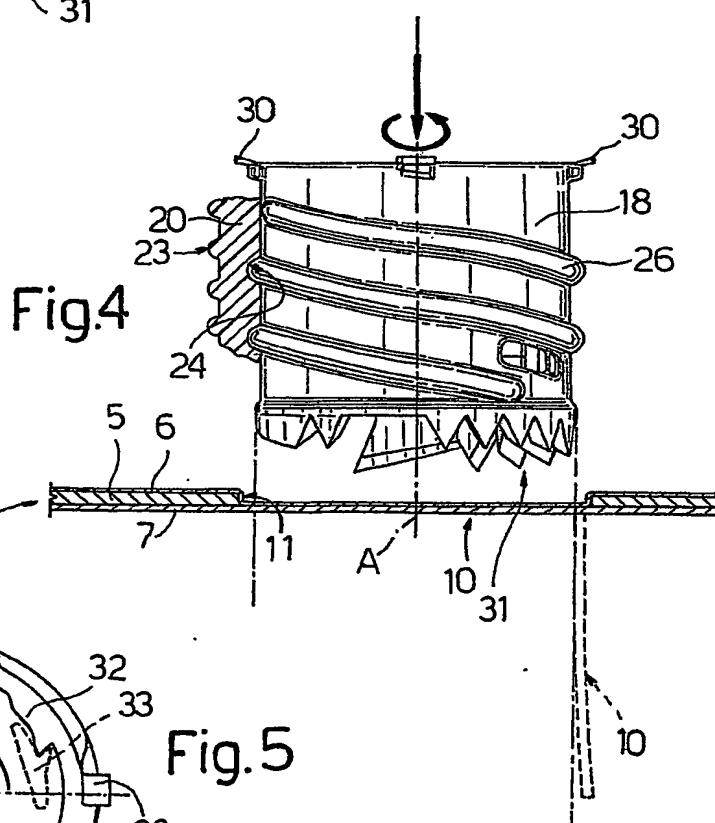
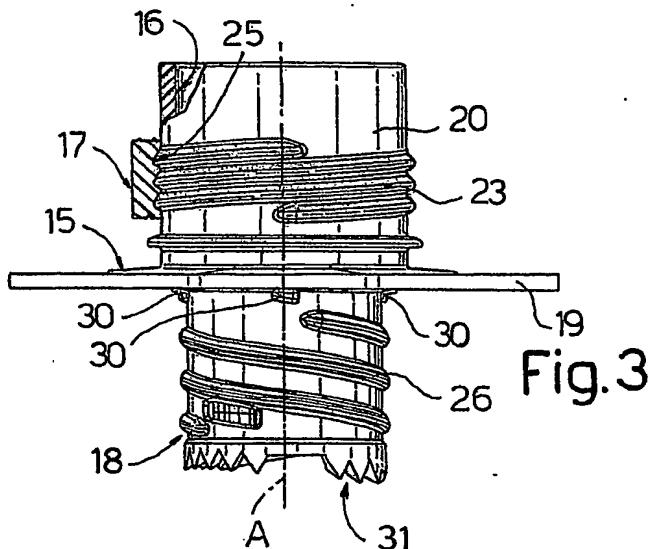


Fig.2

2 / 3



BEST AVAILABLE COPY

3 / 3

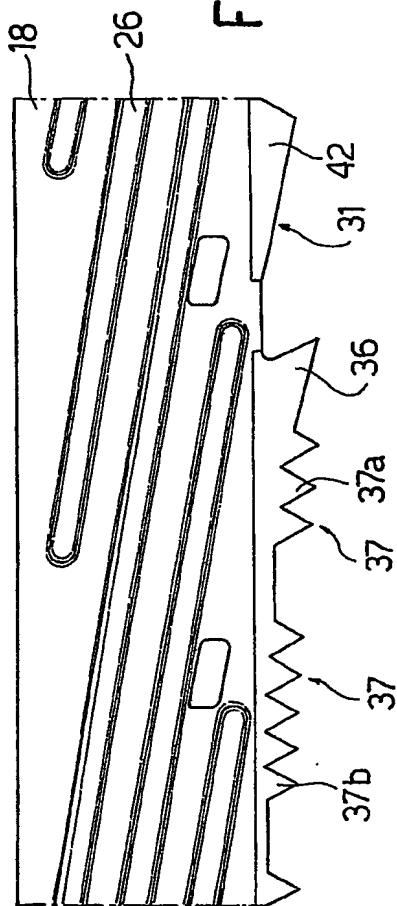
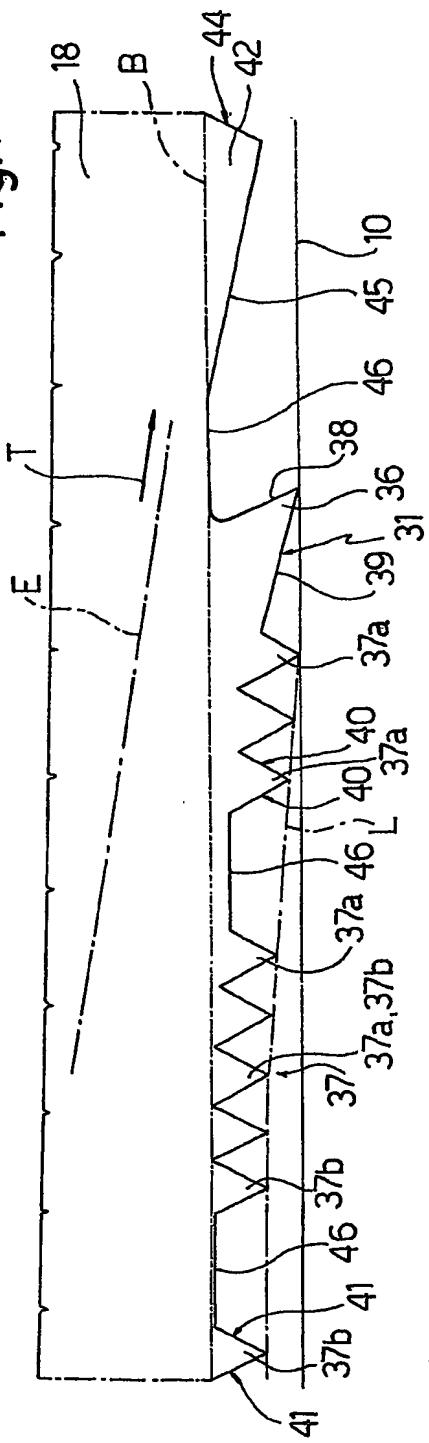


Fig. 7



## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
18 March 2004 (18.03.2004)

PCT

(10) International Publication Number  
**WO 2004/022437 A3**

(51) International Patent Classification<sup>7</sup>:**B65D 5/74**

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:

PCT/EP2003/050614

(22) International Filing Date:

8 September 2003 (08.09.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

02425553.1 9 September 2002 (09.09.2002) EP

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (*for all designated States except US*): TETRA LAVAL HOLDINGS & FINANCE SA [CH/CH]; Avenue Général-Guisan, 70, CH-1009 PULLY (CH).

## Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(72) Inventors; and

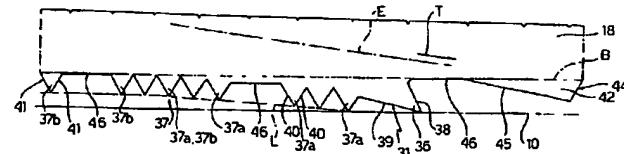
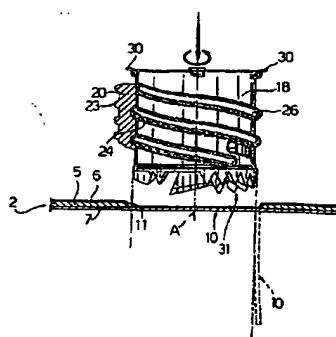
(75) Inventors/Applicants (*for US only*): CASALE, Cristiano [IT/IT]; Via Fellini, 3, I-41057 SPILAMBERTO (IT). DE SIMONI, Sara [IT/IT]; Via Maestri del Lavoro, 81, I-41100 MODENA (IT).

(74) Agents: JORIO, Paolo et al.; STUDIO TORTA S.r.l., Via Viotti, 9, I-10121 TORINO (IT).

(88) Date of publication of the international search report:  
22 April 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: CLOSABLE OPENING DEVICE FOR PACKAGES OF POURABLE FOOD PRODUCTS



WO 2004/022437 A3

(57) Abstract: A closable opening device (4) having a frame (15) defining a through hole (16) and fitted about a pierceable portion (10) of a sealed package (1) for pourable food products; a removable threaded cap (17) which screws onto the frame (15) to close the hole (16); and a tubular cutting member (18) screwed inside the hole (16) and rotated by the cap (17) to travel through the pierceable portion. The cutting member (18) has an end cutting edge (31), in turn having a main blade (36), and a number of teeth (37a) located behind the main blade (36) and decreasing gradually in height so as to act successively on the pierceable portion (10).

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/50614

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B65D5/74

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 07 040982 A (TOPPAN PRINTING CO LTD) 10 February 1995 (1995-02-10) figures 1-8 ---	1,3-6
Y	EP 1 088 765 A (TETRA LAVAL HOLDINGS & FINANCE) 4 April 2001 (2001-04-04) column 8, line 14 -column 9, line 22; claims 1,13; figures 4-8,14 ---	10,11
A	JP 11 171233 A (DAINIPPON PRINTING CO LTD) 29 June 1999 (1999-06-29) figures 1-5 ---	1,3-6
A	DE 38 32 412 A (DAINIPPON PRINTING CO LTD) 13 April 1989 (1989-04-13) column 10, line 2 -column 11, line 35; figures 11A,11B,12A,12B,13A,13B,13C ---	1,3-6
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the International search

27 February 2004

Date of mailing of the International search report

11/03/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Bevilacqua, V

## INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/50614

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 088 764 A (TETRA LAVAL HOLDINGS & FINANCE) 4 April 2001 (2001-04-04) figure 4 ---	1,3-6
A	JP 2000 344262 A (TOPPAN PRINTING CO LTD) 12 December 2000 (2000-12-12) figures 1,2 ---	
A	WO 95 05996 A (INT PAPER CO) 2 March 1995 (1995-03-02) figures 9,11 ---	1-11
A	US 5 482 176 A (MAIETTA MICHAEL ET AL) 9 January 1996 (1996-01-09) figure 12 ---	1-11
A	JP 11 222231 A (TOPPAN PRINTING CO LTD) 17 August 1999 (1999-08-17) figures 1-12 ---	1-11
A,P	EP 1 262 412 A (TETRA LAVAL HOLDINGS & FINANCE) 4 December 2002 (2002-12-04) figures 1-4 ---	1-11
A,P	US 2003/127467 A1 (ADAMS BRIAN M ET AL) 10 July 2003 (2003-07-10) paragraph '0072!; figure 1 ---	1-11
A,P	WO 03 002419 A (DUBACH WERNER FRITZ ;TERXO AG (CH)) 9 January 2003 (2003-01-09) page 13, line 18 - line 26 ---	1-11
E	WO 03 101843 A (SIG TECHNOLOGY LTD ;WEIST MARIO (DE)) 11 December 2003 (2003-12-11) paragraph '0009!; figure 1 -----	1-11

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP 03/50614

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 07040982	A	10-02-1995	NONE		
EP 1088765	A	04-04-2001	EP BR CN JP US	1088765 A1 0004553 A 1290639 A 2001106248 A 6279779 B1	04-04-2001 29-05-2001 11-04-2001 17-04-2001 28-08-2001
JP 11171233	A	29-06-1999	NONE		
DE 3832412	A	13-04-1989	JP DE DE GB GB GB US US US	64051055 U 3832412 A1 3844985 C2 2210359 A ,B 2241224 A ,B 2241225 A ,B 4948015 A 5027979 A 5069372 A	29-03-1989 13-04-1989 25-09-2003 07-06-1989 28-08-1991 28-08-1991 14-08-1990 02-07-1991 03-12-1991
EP 1088764	A	04-04-2001	EP BR CN JP TW US	1088764 A1 0004583 A 1290638 A 2001106249 A 474883 B 6398075 B1	04-04-2001 29-05-2001 11-04-2001 17-04-2001 01-02-2002 04-06-2002
JP 2000344262	A	12-12-2000	NONE		
WO 9505996	A	02-03-1995	AU BR CA EP FI JP NO WO	7519094 A 9407361 A 2170409 A1 0714376 A1 960893 A 9501890 T 960755 A 9505996 A1	21-03-1995 23-04-1996 02-03-1995 05-06-1996 26-04-1996 25-02-1997 23-04-1996 02-03-1995
US 5482176	A	09-01-1996	AU BR CA CN CZ EP FI JP NZ WO	2123695 A 9507068 A 2185563 A1 1143936 A 9602707 A3 0750566 A1 963637 A 9510422 T 283239 A 9525042 A1	03-10-1995 30-09-1997 21-09-1995 26-02-1997 18-03-1998 02-01-1997 07-11-1996 21-10-1997 24-03-1997 21-09-1995
JP 11222231	A	17-08-1999	NONE		
EP 1262412	A	04-12-2002	EP JP US	1262412 A1 2003026219 A 2002179605 A1	04-12-2002 29-01-2003 05-12-2002
US 2003127467	A1	10-07-2003	US WO	2003106911 A1 03050033 A1	12-06-2003 19-06-2003

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/EP 03/50614

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
WO 03002419	A	09-01-2003	WO 03002419 A1	09-01-2003
WO 03101843	A	11-12-2003	WO 03101843 A1	11-12-2003

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**